DRAINAGE AND WATER QUALITY REPORT FOR PLAZA DE LA GUERRA IMPROVEMENTS

Santa Barbara, California

February 14, 2011
Updated July 14, 2011

CLIENT: Campbell & Campbell Architects

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WORK ORDER NO.: 17209.02

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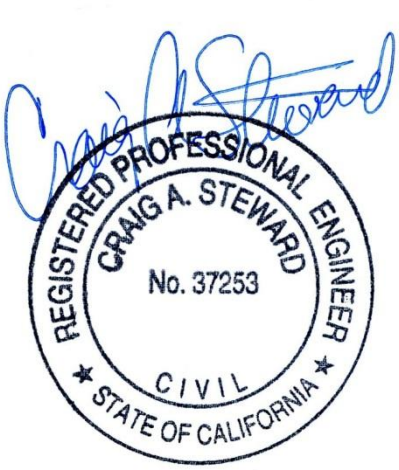
PROJECT ENGINEER: Craig A. Steward, P.E., CFM



PURPOSE OF REPORT

The purpose of this report is to address the questions and concerns relating to drainage and storm water quality that are part of the Development Application Review Team (DART) process.

LOCATION

The project is located in historic Plaza De La Guerra in the City of Santa Barbara. See Figure A.

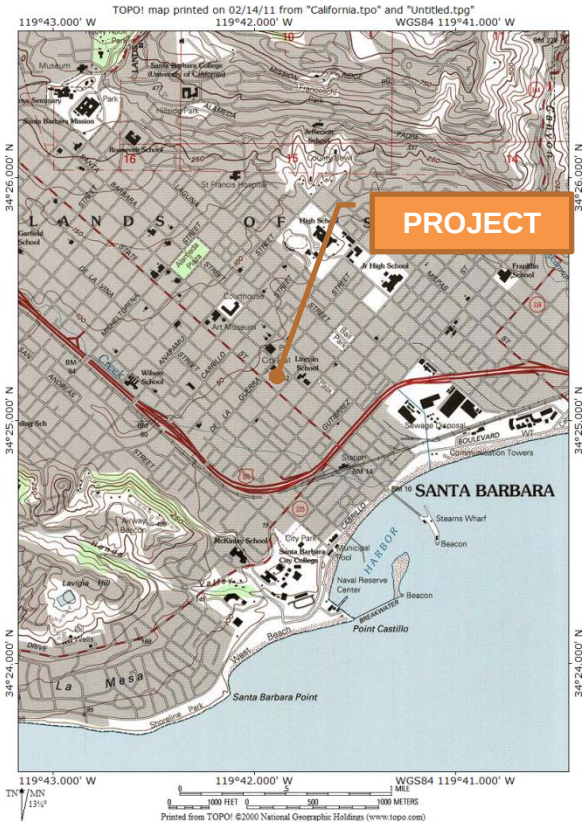


Figure A - Vicinity Map

BACKGROUND

The City of Santa Barbara is proposing grading and paving improvements to Plaza De La Guerra that will include removal and replacement of existing paving and sidewalk with more attractive surfacings. Other changes include regrading the plaza center to accept storm water runoff from the adjacent street surfaces.

The existing drainage situation in the plaza is currently problematic. All runoff is routed through a single 12" diameter pipe that discharges to the gutter in Anacapa Street. See Exhibit 1 (Existing Drainage Facilities). Overland escape from the plaza is almost non-existent and the potential exists for flooding portions of the Santa Barbara News Press building during large, infrequent storms.

Storm flows from the Plaza De La Guerra area are currently untreated. Potential pollutants include:

- Petroleum products and heavy metals from over 30 automobile parking spaces and city traffic.
- Roof runoff from adjacent buildings.
- Bacteria from feces and trash at the plaza and surrounding area.

Because the amount of paving being replaced exceeds 4,000 square feet, the project falls under Tier 3 (most restrictive) storm water quality requirements.

METHOD OF ANALYSIS

In preparation for the analysis, a topographic map of the Plaza De La Guerra percolation testing were provided by the City of Santa Barbara. In addition, the plaza and surrounding areas were walked and photographically documented. Drainage divides were identified. The approximate route of the existing storm drain was identified, and overland escape routes were inspected.

The drainage areas of the study area were delineated and are shown on Exhibit 2 (Pre-Project Watersheds). Then using preliminary improvement plans provided by Campbell & Campbell Architects and preliminary grading concepts developed by Penfield & Smith, drainage areas for the post-project condition were delineated and are shown on Exhibit 3 (Post-Project Watersheds).

Time of concentration was calculated using the TR-55 method with no minimum time of concentration. This was done in order to better model the impact of Low Impact Development (LID) techniques being proposed for this project.

Soil type information was taken from the Natural Resource Conservation Service (NRCS) web site.

Development type was identified using NRCS curve numbers associated for particular types of cover. In the case of the post-project condition, some of the NRCS curve numbers were adjusted to account for LID techniques as presented in the American Society of Civil Engineers webinar "Curve Number and Vegetative Techniques to Manage Stormwater Runoff Sustainably, 2010".

Drainage Evaluation

Using the HydroCAD v 8.50 program and methodologies outlined in the City of Santa Barbara Technical Guidance Manual for Post-Construction Storm Water Management (Storm Water BMP Guidance Manual), June 2008 (Final), peak flow rates were calculated for all areas tributary to the single point of discharge in Plaza De La Guerra (the existing 12-inch diameter storm drain which discharges to Santa Barbara Street). Peak flow rates were calculated for the 25-year and 100-year events for drainage flows.

The outlet conditions were identified and evaluated for capability to pass through a grated catch basin and for the ability to pass through the existing 12-inch diameter storm drain pipe. Because the catch basin is located in a sump condition, the 100-year peak flow rate was used to assess adequacy of drainage devices. In addition, the size of a grated catch basin was calculated by applying a factor of safety of 2 to account for plugging of a grate.

Both pre-project and post-project conditions were evaluated.

Water Quality Evaluation

The project area is constrained on all sides with buildings and parking areas. The outlet elevation is fixed by the location of the existing 12" diameter storm drain. Under the pre-project condition, storm water flows off of the grassed mound and across parking and driving surfaces and into a grated inlet. In the post-project condition, the storm water will flow from the building roofs and parking/driving areas, across vegetated or infiltrative filters and into a grated inlet.

The soil type identified in the NRCS mapping is Hydrologic Soil Type D which indicates slow infiltration. Three borings were completed and a falling-head infiltration test was prepared by P.W. Environmental. Depth of seasonally high groundwater was estimated to be approximately 15 feet below the existing ground level. The test results are summarized in Table 1. All infiltration rates were greater than or equal to the minimum allowable infiltration rate (0.5 inches per hour).

Table 1 - Infiltration Test Results

Boring	Depth of Boring ft	Slowest Infiltration Rate in/hr
1	5	0.5
2	9	1.0
3	7	1.5

With the implementation of the project improvements, the calculated amount of impervious surfaces is increased. See Table 2[1].

Table 2 - Impervious Analysis of Project Site

	Pre-Project	Percent of Total	Post-Project	Percent of Total
Total Paved Area, sf	29153	62.7	35712	76.9
Total Lawn/Planted Area/Turf/DG, sf	17307	37.3	10748	23.1
Total, sf	46,460		46,460	

However, by reducing the amount of directly connected impervious surfaces (by running the storm water across the vegetated surfaces) and slowing down the runoff, the calculated times of concentration are increased. Detailed calculations are attached.

Storm Water Quality Criteria

Based on the criteria published in the City of Santa Barbara Technical Guidance Manual for Post-Construction Storm Water Management dated June 2008, the proposed project was identified falling under the Tier 3 requirements because improvements included more than 4,000 square feet of new or replaced impervious surfaces. Tier 3 requirements are:

- Post-Project peak runoff discharge shall not exceed the pre-project peak runoff rate
- Project shall retain on-site the larger of either the volume difference between the pre-project and post-project condition or the volume from a one-inch, 24-hour rainfall event.
- Storm water quality treatment shall be provided via volume based or flow based Best Management Practices (BMPs). See Exhibit 4 for BMP locations. See Exhibit 5 for tributary treatment areas of the proposed BMPs.

Analysis to show compliance with these requirements was done in the following manner:

- Peak flow rates and volumes were calculated for 1-inch, 2-year, 5-year, 10-year, and 25-year events
- Anticipated pollutants were treated using the following BMPs. Detailed calculations are attached.
    - Vegetated Swale Filter (BMP Manual Section 6.6.2)
    - Vegetated Strip Filter (BMP Manual Section 6.6.3)
    - Infiltration Trench (BMP Manual Section 6.7)

[1] Campbell & Campbell Proposed Features Plan, Dwg No. L-5.1, 30% Draft. Note that permeable paving within sidewalk areas has been assumed to be impervious.

Where some of these conditions cannot be feasibly be met either partially or in total, the City of Santa Barbara has the ability to provide exemptions, depending on the particular site conditions.

FINDINGS

This section summarizes the findings of the analysis for both drainage and storm water quality. Detailed calculations are attached to this report. A DART Storm Water Management Plan Checklist has also been filled out and attached for the reviewer's convenience.

Drainage Evaluation

The peak 100-year flow rate tributary to the existing 12-inch diameter storm drain for both the pre-project and post-project condition is shown in Table 1. The table also includes the elevation of the overland escape, and the elevation of the lowest adjacent floor of the Santa Barbara News Press building.

Table 3 - Hydraulic Summary Table

	Pre-Project	Post-Project
Q_{100}, cfs	7.39	6.14
Tributary Area, acres	1.56	1.56
Landscape Area, acres	0.47	0.31
Hardscape Area, acres	1.09	1.25
Overland Escape Elevation, ft NAVD1988	38.81	38.81
100-year Ponded Water Elevation[2], ft NAVD1988	39.48	38.90
Lowest Adjacent Floor Elevation, ft NAVD1988	39.08	39.08

The proposed project will improve the hydraulic conditions within the study area by reducing the peak flow rates and reducing the ponding elevation within Plaza De La Guerra. Under the pre-project conditions the Santa Barbara News Press Building is potentially subject to shallow flooding during a 100-year rainfall event. In the post-project condition, the 100-year rainfall event would result in a ponded water elevation approximately 2 inches below the Santa Barbara News Press building's lowest floor elevation.

Drainage improvements required for the post-project condition are:

- A 36" x 36" traffic-rated grate installed within the grassed area of the plaza, set at elevation 38.00 feet NAVD1988.
- An 18" x 18" traffic-rated grate installed within the road area to replace the existing catch basin, set at elevation 38.55 NAVD1988.

Water Quality Evaluation

Peak Flow Rates

Table 4 provides a comparison of pre-project and post-project peak flow rates. Since the peak flow rate under the post-project condition is less than the pre-project condition in all cases, the peak flow reduction requirement is met.

[2] Assuming no overflow.

Table 4 - Pre- Project and Post-Project Peak Flow Rate Comparison

Return Period	Pre-Project	Post-Project	ΔQ
	cfs	cfs	cfs
2	2.62	2.11	-0.51
5	3.91	3.19	-0.72
10	4.77	3.92	-0.85
25	5.84	4.83	-1.01

Runoff Volume Reduction

The was no difference between the post-project condition 25-year runoff volume and pre-project 25-year runoff volume.

The one-inch 24-hour storm over the proposed project area generates 2,614 cubic feet of runoff volume. Because the one-inch runoff is larger than the change in 25-year runoff volume, the site must retain, on-site at least 2,614 cubic feet of runoff volume ($V_{reduction}$ = 2,614 cubic feet).

An infiltration trench is proposed and has been sized to accept more than 2,614 cubic feet of runoff volume based on an infiltration rate of 0.5 inches per hour. The infiltration trench will need to be approximately 4 feet wide, 30 feet long, and 3 feet deep. Pretreatment of waters will be provided by the vegetated strip filter and the vegetated swale filter. See attached calculation.

Storm Water Treatment

The post-project configuration allows for the filtering of 100-percent of the storm water. Complete sizing calculations are attached.

- A portion of the site (Area Y) will receive water quality treatment by flowing through a vegetated swale filter.
- A portion (Area X) will receive water quality treatment by flowing across a vegetated filter strip.
- Storm water from Areas X, Y, and Z will be treated in the infiltration trench.

See Exhibit 4 (Water Quality BMP locations) and Exhibit 5 (Water Quality Filtration Diagram).

CONCLUSIONS

Based on our evaluation of the site with the proposed improvements, we make the following conclusions:

1. Overland escape of flood waters at this site is inadequate under the pre-project conditions and extremely marginal under post-project conditions. The situation is complicated by the fact that the most likely avenue for improvement of overland escape (a small walkway) is located on private land owned by the Santa Barbara News Press. See Exhibit 3 (Post-Project Condition). We recommend that the City explore a cooperative effort to improve the overland escape conditions by lowering the walkway which would directly benefit the Santa Barbara News Press.

2. The proposed site design meets the peak flow rate reduction requirements of the City of Santa Barbara by reducing post-project peak flow rates to less than or equal to the pre-project peak flow rates.
3. The proposed site design meets the volume reduction requirements of the City of Santa Barbara by infiltration the one-inch 24-hour storm water volume from the project area.
4. The proposed site design meets the storm water quality treatment requirements of the City of Santa Barbara by treating storm water runoff from 100 percent of the project area using BMPs and BMP design methods recommended in the City's Technical Guidance Manual.

CALCULATIONS AND ATTACHMENTS

DISCHARGE TO GUTTER

EXISTING 12" STORM DRAIN LOCATION APPROXIMATE

GRATED CATCHBASIN IN PLAZA DE LA GUERRA

ANACAPA STREET

ANACAPA

CITY HALL

DE LA GUERRA PLAZA

STATE STREET

STATE

SANTA BARBARA NEWSPRESS

EXHIBIT 1

BENCHMARK:
ELEV:
BASIS OF BEARINGS:

DATE: 4-19-2006
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REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

DESIGN DESIGN
DRAWN DRAWN
CHECKED CHECKED
FLD.BK.NO. ____
PAGE SB_AUTOMAP
ATLAS WTR/SWR #

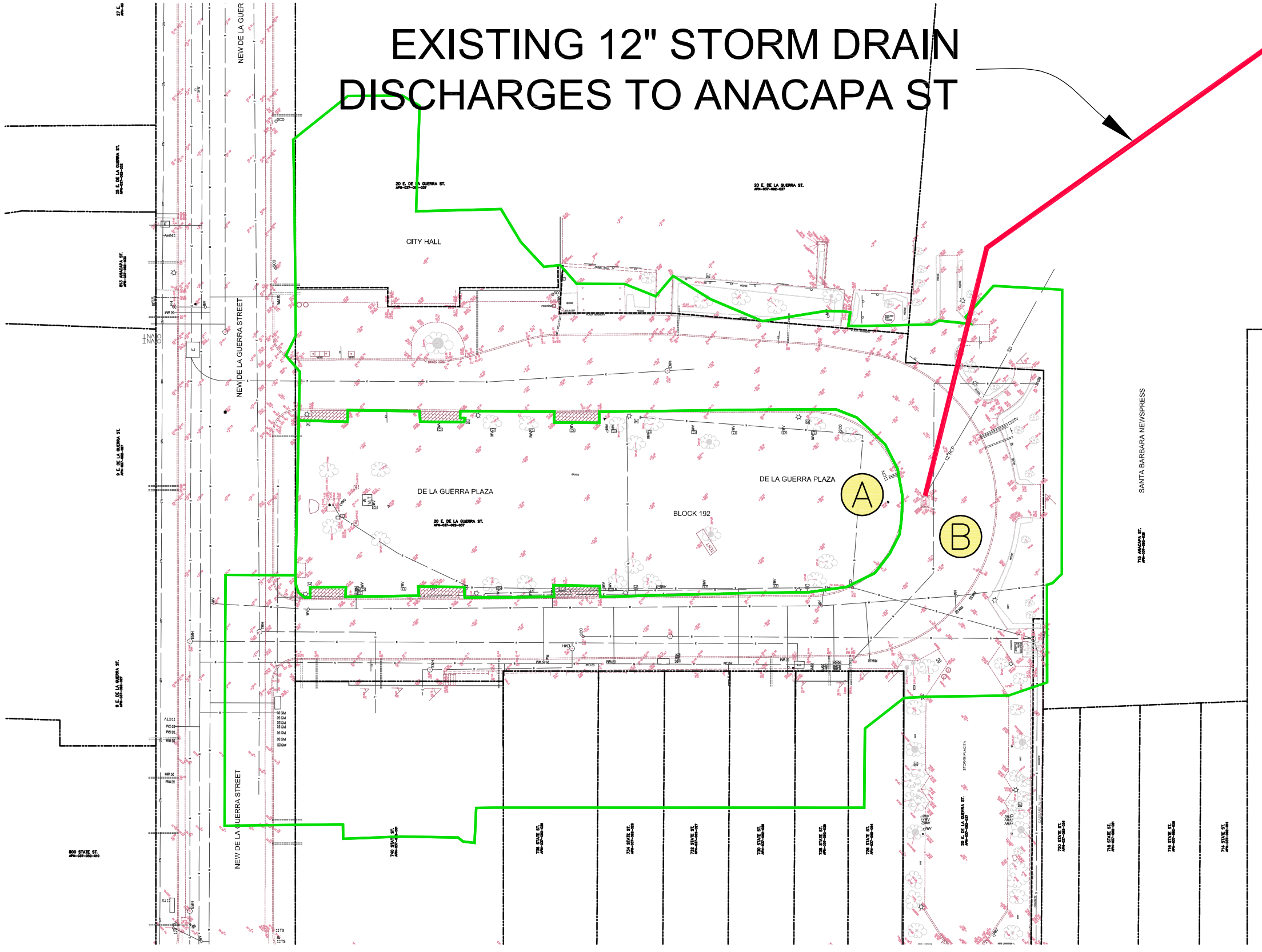
EXISTING DRAINAGE FACILITIES
PLAZA DE LA GUERRA

CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT–ENGINEERING DIVISION
APPROVED : _____ DATE _____ ,20 _____
CITY ENGINEER

SCALE:
VERT. NA
HOR. 1" = 10'
ARCH. NO. ARCH#

PROJ. NO. 8961
SHT. 4 OF 5 SHTS.
DWG. NO. C-1-#####

EXISTING 12" STORM DRAIN DISCHARGES TO ANACAPA ST



LEGEND

WATERSHED BOUNDARY

B — WATERSHED DESIGNATION

EXHIBIT 2

BENCHMARK:
ELEV:
BASIS OF BEARINGS:

DATE: 4-19-2006
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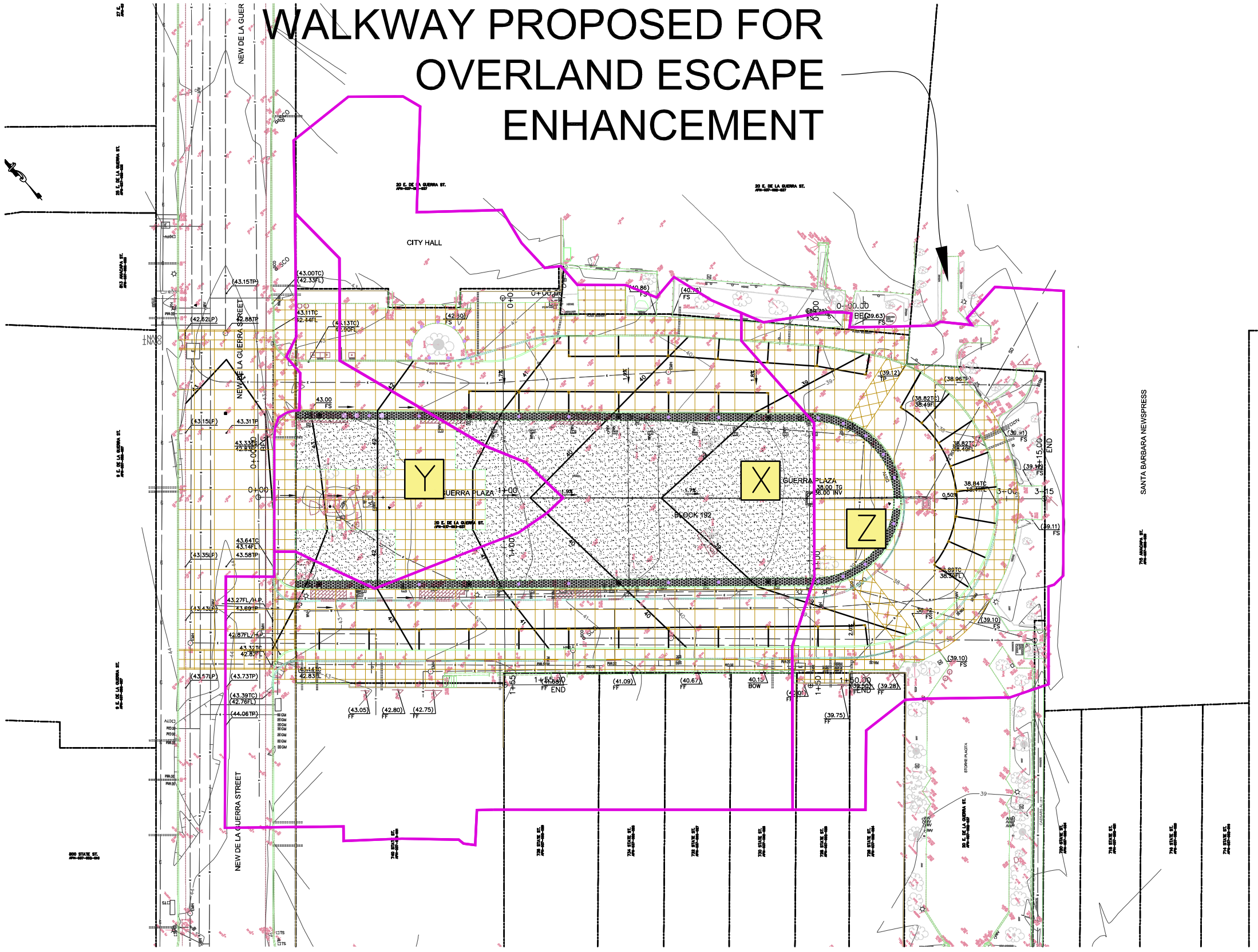
PRE-PROJECT CONDITION WATERSHEDS
PLAZA DE LA GUERRA

CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT–ENGINEERING DIVISION
APPROVED :
CITY ENGINEER DATE ,20

SCALE:
VERT. NA
HOR. 1" = 10'
ARCH. NO. ARCH#

PROJ. NO. 8961
SHT. 4 OF 5 SHTS.
DWG. NO. C-1-####

WALKWAY PROPOSED FOR OVERLAND ESCAPE ENHANCEMENT



LEGEND

WATERSHED BOUNDARY

Z — WATERSHED DESIGNATION

EXHIBIT 3

BENCHMARK:
ELEV:
BASIS OF BEARINGS:

DATE: 4-19-2006
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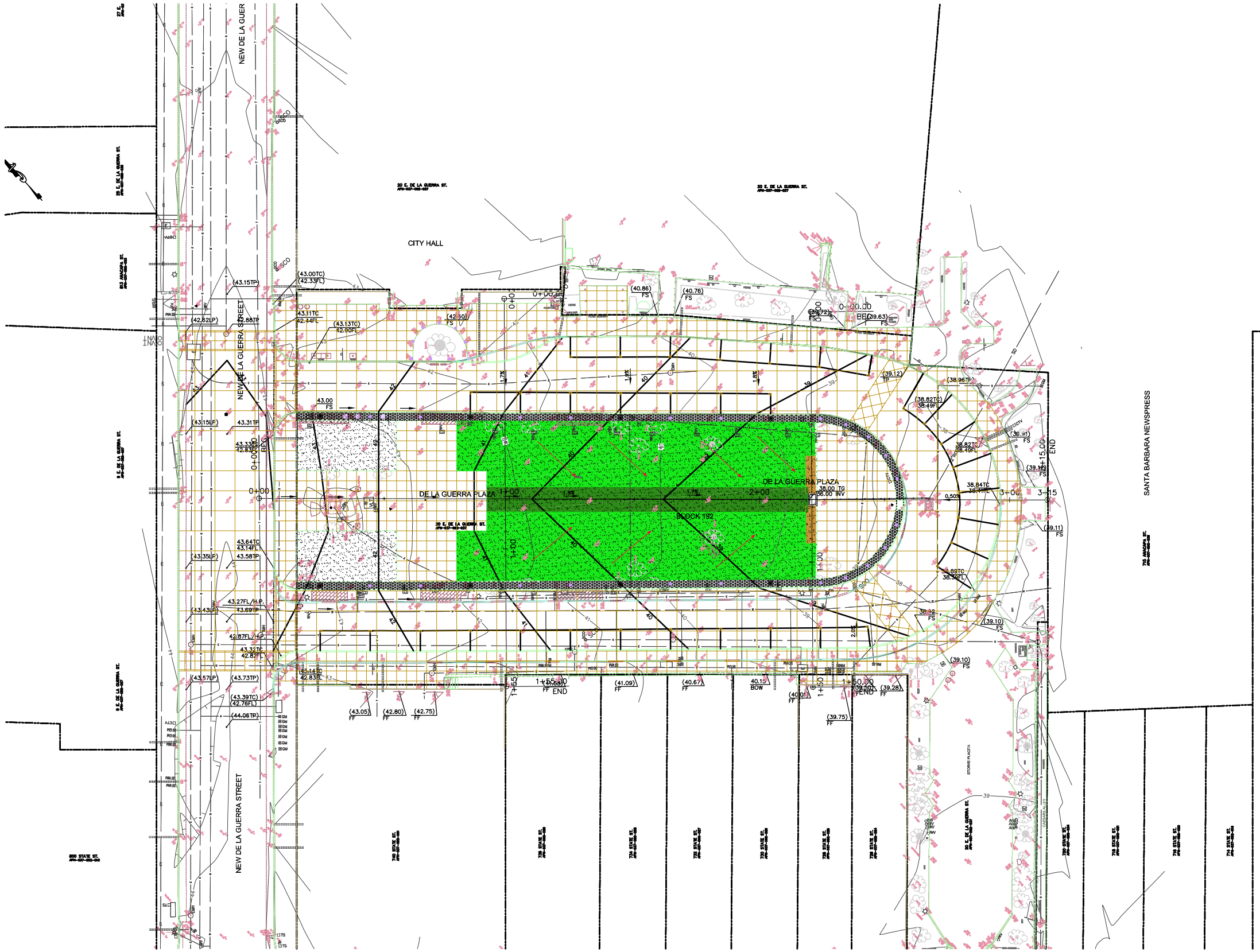
POST-PROJECT CONDITION WATERSHEDS
PLAZA DE LA GUERRA

CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT–ENGINEERING DIVISION
APPROVED :
CITY ENGINEER DATE ,20

SCALE:
VERT. NA
HOR. 1" = 10'
ARCH. NO. ARCH#

PROJ. NO. 8961
SHT. 4 OF 5 SHTS.
DWG. NO. C-1-#####



LEGEND

BMP LOCATIONS:

VEGETATED FILTER SWALE

VEGETATED FILTER STRIP

INFILTRATION TRENCH

FLOW DIRECTION

EXHIBIT 4

BENCHMARK:
ELEV:
BASIS OF BEARINGS:

DATE: 4-19-2006
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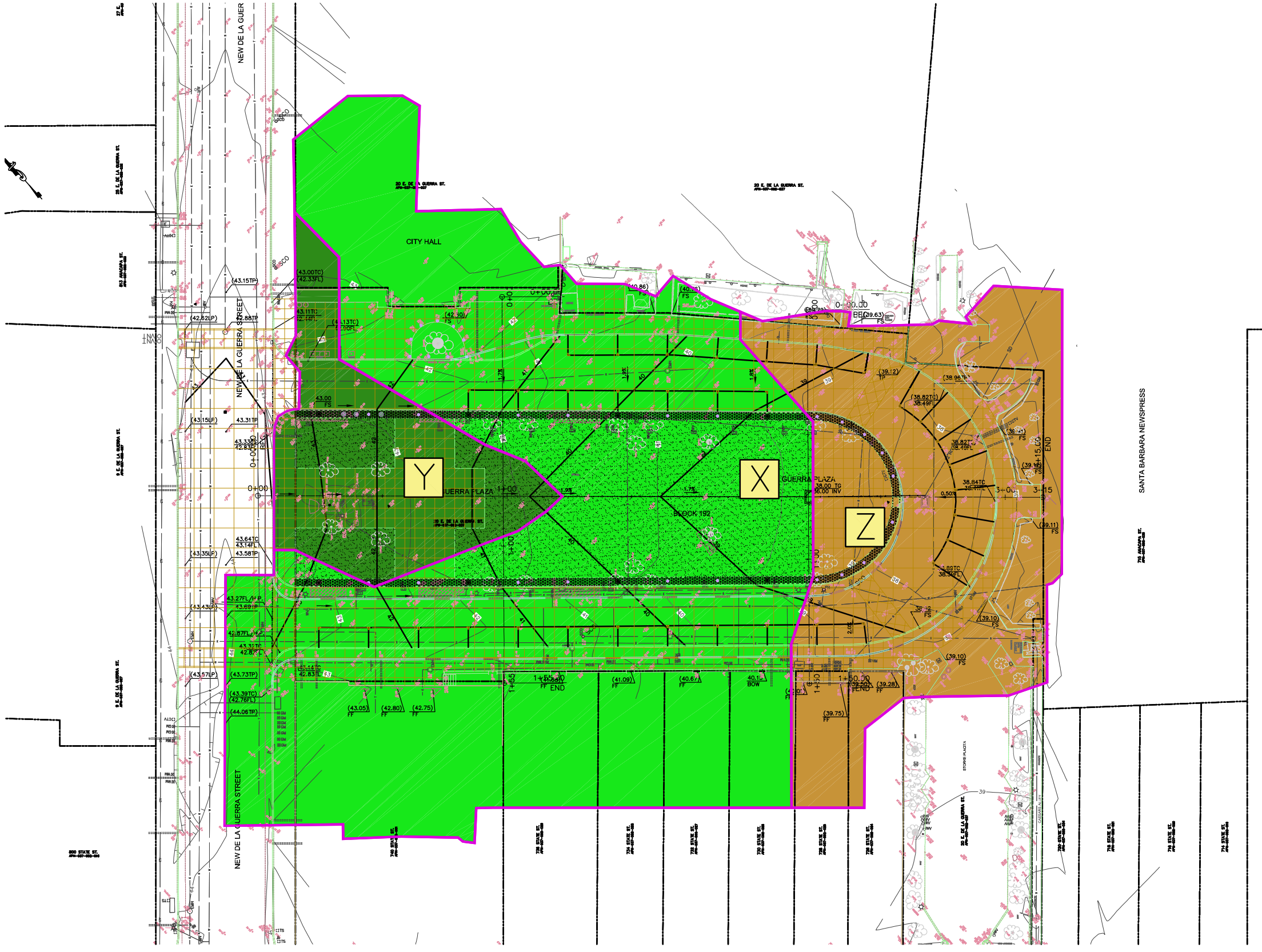
WATER QUALITY BMP LOCATIONS

PLAZA DE LA GUERRA

CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT–ENGINEERING DIVISION
APPROVED :
CITY ENGINEER DATE ,20

SCALE:
VERT. NA
HOR. 1" = 10'
ARCH. NO. ARCH#

PROJ. NO. 8961
SHT. 4 OF 5 SHTS.
DWG. NO. C-1-#####



LEGEND

WATERSHED BOUNDARY

Z — WATERSHED DESIGNATION

AREA FILTERED BY:

VEGETATED FILTER SWALE

VEGETATED FILTER STRIP

INFILTRATION TRENCH

EXHIBIT 5

BENCHMARK:
ELEV:
BASIS OF BEARINGS:

REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

DESIGN DESIGN
DRAWN DRAWN
CHECKED CHECKED
FLD.BK.NO.
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ATLAS WTR/SWR #

WATER QUALITY FILTRATION DIAGRAM
PLAZA DE LA GUERRA

CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT—ENGINEERING DIVISION
APPROVED :
CITY ENGINEER DATE ,20

SCALE:
VERT. NA
HOR. 1" = 10'
ARCH. NO. ARCH#

PROJ. NO. 8961
SHT. 4 OF 5 SHTS.
DWG. NO. C-1-####

DATE: 4-19-2006
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Time span=0.00-48.00 hrs, dt=0.10 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed A Runoff Area=0.390 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=235' Slope=0.0230 '/' Tc=28.6 min CN=80/0 Runoff=0.17 cfs 0.046 af

Subcatchment 2S: Watershed B Runoff Area=1.170 ac 93.16% Impervious Runoff Depth=2.91"
Flow Length=329' Tc=2.0 min CN=89/98 Runoff=2.47 cfs 0.283 af

Subcatchment 4S: Watershed X Runoff Area=0.990 ac 66.97% Impervious Runoff Depth=2.43"
Flow Length=100' Slope=0.0180 '/' Tc=15.9 min CN=79/98 Runoff=1.09 cfs 0.200 af

Subcatchment 5S: Watershed Y Runoff Area=0.170 ac 76.47% Impervious Runoff Depth=2.60"
Flow Length=113' Tc=8.8 min CN=80/98 Runoff=0.25 cfs 0.037 af

Subcatchment 6S: Watershed Z Runoff Area=0.400 ac 87.50% Impervious Runoff Depth=2.86"
Flow Length=110' Slope=0.0100 '/' Tc=1.8 min CN=89/98 Runoff=0.83 cfs 0.095 af

Pond 3P: Pre-Project Condition (to Catchbasin) Inflow=2.62 cfs 0.329 af
Primary=2.62 cfs 0.329 af

Pond 7P: Post-Project Condition (to Catch Basin) Inflow=2.11 cfs 0.332 af
Primary=2.11 cfs 0.332 af

Total Runoff Area = 3.120 ac Runoff Volume = 0.661 af Average Runoff Depth = 2.54"
28.43% Pervious = 0.887 ac 71.57% Impervious = 2.233 ac

Time span=0.00-48.00 hrs, dt=0.10 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed A Runoff Area=0.390 ac 0.00% Impervious Runoff Depth=2.56"
Flow Length=235' Slope=0.0230 '/' Tc=28.6 min CN=80/0 Runoff=0.34 cfs 0.083 af

Subcatchment 2S: Watershed B Runoff Area=1.170 ac 93.16% Impervious Runoff Depth=4.31"
Flow Length=329' Tc=2.0 min CN=89/98 Runoff=3.62 cfs 0.420 af

Subcatchment 4S: Watershed X Runoff Area=0.990 ac 66.97% Impervious Runoff Depth=3.74"
Flow Length=100' Slope=0.0180 '/' Tc=15.9 min CN=79/98 Runoff=1.68 cfs 0.309 af

Subcatchment 5S: Watershed Y Runoff Area=0.170 ac 76.47% Impervious Runoff Depth=3.95"
Flow Length=113' Tc=8.8 min CN=80/98 Runoff=0.38 cfs 0.056 af

Subcatchment 6S: Watershed Z Runoff Area=0.400 ac 87.50% Impervious Runoff Depth=4.25"
Flow Length=110' Slope=0.0100 '/' Tc=1.8 min CN=89/98 Runoff=1.22 cfs 0.142 af

Pond 3P: Pre-Project Condition (to Catchbasin) Inflow=3.91 cfs 0.503 af
Primary=3.91 cfs 0.503 af

Pond 7P: Post-Project Condition (to Catch Basin) Inflow=3.19 cfs 0.507 af
Primary=3.19 cfs 0.507 af

Total Runoff Area = 3.120 ac Runoff Volume = 1.010 af Average Runoff Depth = 3.88"
28.43% Pervious = 0.887 ac 71.57% Impervious = 2.233 ac

Time span=0.00-48.00 hrs, dt=0.10 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed A Runoff Area=0.390 ac 0.00% Impervious Runoff Depth=3.38"
Flow Length=235' Slope=0.0230 '/' Tc=28.6 min CN=80/0 Runoff=0.46 cfs 0.110 af

Subcatchment 2S: Watershed B Runoff Area=1.170 ac 93.16% Impervious Runoff Depth=5.24"
Flow Length=329' Tc=2.0 min CN=89/98 Runoff=4.38 cfs 0.511 af

Subcatchment 4S: Watershed X Runoff Area=0.990 ac 66.97% Impervious Runoff Depth=4.64"
Flow Length=100' Slope=0.0180 '/' Tc=15.9 min CN=79/98 Runoff=2.09 cfs 0.383 af

Subcatchment 5S: Watershed Y Runoff Area=0.170 ac 76.47% Impervious Runoff Depth=4.86"
Flow Length=113' Tc=8.8 min CN=80/98 Runoff=0.46 cfs 0.069 af

Subcatchment 6S: Watershed Z Runoff Area=0.400 ac 87.50% Impervious Runoff Depth=5.19"
Flow Length=110' Slope=0.0100 '/' Tc=1.8 min CN=89/98 Runoff=1.47 cfs 0.173 af

Pond 3P: Pre-Project Condition (to Catchbasin) Inflow=4.77 cfs 0.621 af
Primary=4.77 cfs 0.621 af

Pond 7P: Post-Project Condition (to Catch Basin) Inflow=3.92 cfs 0.625 af
Primary=3.92 cfs 0.625 af

Total Runoff Area = 3.120 ac Runoff Volume = 1.246 af Average Runoff Depth = 4.79"
28.43% Pervious = 0.887 ac 71.57% Impervious = 2.233 ac

Time span=0.00-48.00 hrs, dt=0.10 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed A Runoff Area=0.390 ac 0.00% Impervious Runoff Depth=4.43"
Flow Length=235' Slope=0.0230 '/' Tc=28.6 min CN=80/0 Runoff=0.61 cfs 0.144 af

Subcatchment 2S: Watershed B Runoff Area=1.170 ac 93.16% Impervious Runoff Depth=6.40"
Flow Length=329' Tc=2.0 min CN=89/98 Runoff=5.32 cfs 0.624 af

Subcatchment 4S: Watershed X Runoff Area=0.990 ac 66.97% Impervious Runoff Depth=5.76"
Flow Length=100' Slope=0.0180 '/' Tc=15.9 min CN=79/98 Runoff=2.59 cfs 0.475 af

Subcatchment 5S: Watershed Y Runoff Area=0.170 ac 76.47% Impervious Runoff Depth=5.99"
Flow Length=113' Tc=8.8 min CN=80/98 Runoff=0.57 cfs 0.085 af

Subcatchment 6S: Watershed Z Runoff Area=0.400 ac 87.50% Impervious Runoff Depth=6.34"
Flow Length=110' Slope=0.0100 '/' Tc=1.8 min CN=89/98 Runoff=1.79 cfs 0.211 af

Pond 3P: Pre-Project Condition (to Catchbasin) Inflow=5.84 cfs 0.768 af
Primary=5.84 cfs 0.768 af

Pond 7P: Post-Project Condition (to Catch Basin) Inflow=4.83 cfs 0.771 af
Primary=4.83 cfs 0.771 af

Total Runoff Area = 3.120 ac Runoff Volume = 1.539 af Average Runoff Depth = 5.92"
28.43% Pervious = 0.887 ac 71.57% Impervious = 2.233 ac

Summary for Subcatchment 8S: Distrubed Area

Runoff = 0.39 cfs @ 10.02 hrs, Volume= 0.060 af, Depth= 0.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type I 24-hr 1 inch Rainfall=1.00"

	Area (ac)	CN	Description
*	1.070	93	Urban commercial, 85% imp, HSG C
	0.160	65	Pervious Area
	0.909	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0					**Direct Entry,**

Time span=0.00-48.00 hrs, dt=0.10 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed A Runoff Area=0.390 ac 0.00% Impervious Runoff Depth=5.98"
Flow Length=235' Slope=0.0230 '/' Tc=28.6 min CN=80/0 Runoff=0.83 cfs 0.194 af

Subcatchment 2S: Watershed B Runoff Area=1.170 ac 93.16% Impervious Runoff Depth=8.07"
Flow Length=329' Tc=2.0 min CN=89/98 Runoff=6.66 cfs 0.787 af

Subcatchment 4S: Watershed X Runoff Area=0.990 ac 66.97% Impervious Runoff Depth=7.39"
Flow Length=100' Slope=0.0180 '/' Tc=15.9 min CN=79/98 Runoff=3.32 cfs 0.609 af

Subcatchment 5S: Watershed Y Runoff Area=0.170 ac 76.47% Impervious Runoff Depth=7.63"
Flow Length=113' Tc=8.8 min CN=80/98 Runoff=0.73 cfs 0.108 af

Subcatchment 6S: Watershed Z Runoff Area=0.400 ac 87.50% Impervious Runoff Depth=8.01"
Flow Length=110' Slope=0.0100 '/' Tc=1.8 min CN=89/98 Runoff=2.25 cfs 0.267 af

Pond 3P: Pre-Project Condition (to Catchbasin) Inflow=7.39 cfs 0.981 af
Primary=7.39 cfs 0.981 af

Pond 7P: Post-Project Condition (to Catch Basin) Inflow=6.14 cfs 0.984 af
Primary=6.14 cfs 0.984 af

Total Runoff Area = 3.120 ac Runoff Volume = 1.965 af Average Runoff Depth = 7.56"
28.43% Pervious = 0.887 ac 71.57% Impervious = 2.233 ac

Santa Barbara County - Flood Control District

123 E. Anapamu St., Santa Barbara, CA 93101
805.568.3440 - www.countyofsb.org/pwd

Official Rainfall Intensity Record

(Maximum Short-Depth-Duration Rainfall, with Expected Return Periods)

Station Number: 234 **Latitude:** 342531 **Longitude:** 1194212

Station Name: Santa Barbara (Downtown-County Building) **Elevation (ft):** 100 **Rainfall (in.)**

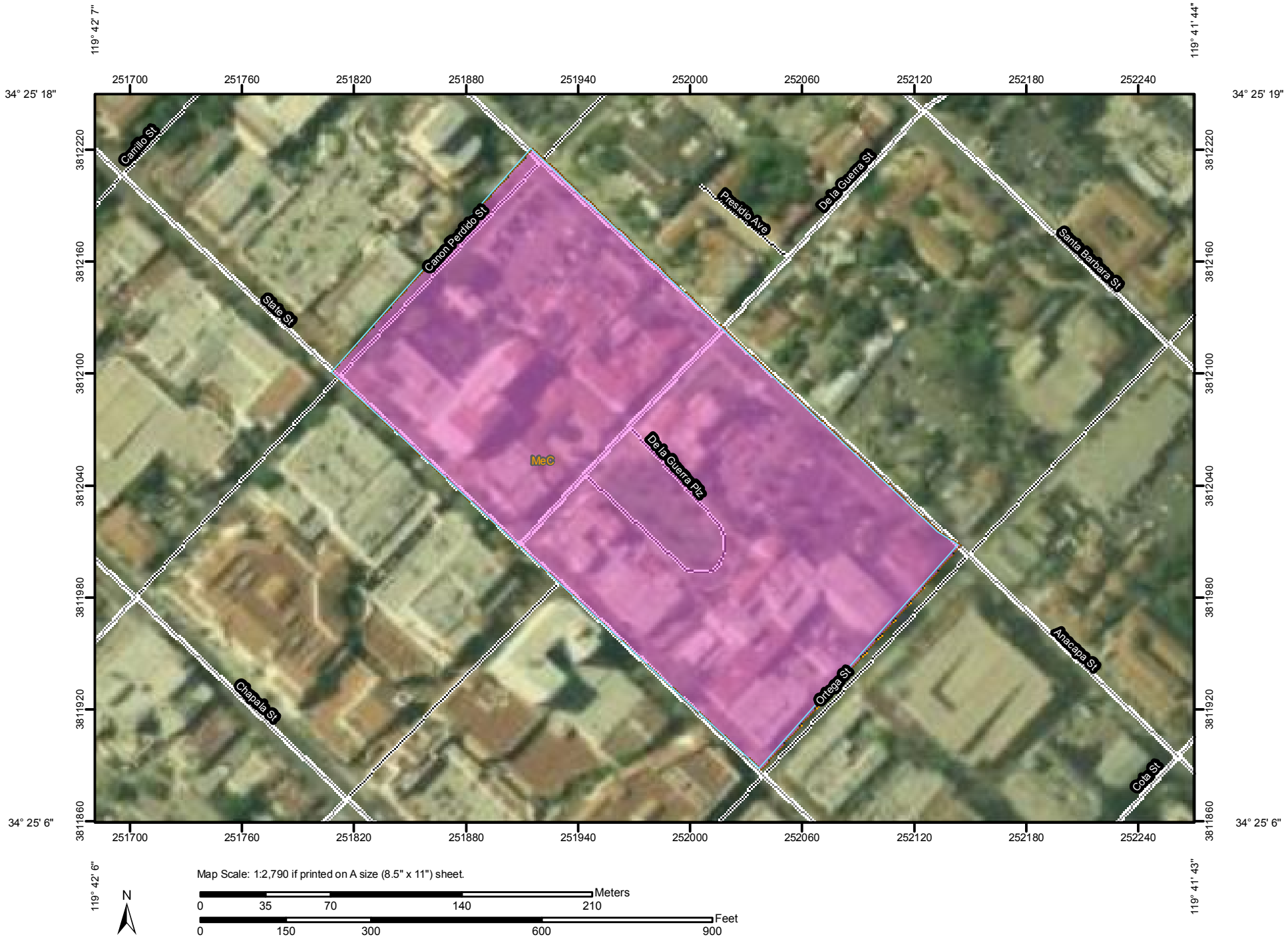
WY	5min	10min	15min	30min	1hr	2hr	3hr	6hr	8hr	12hr	24hr	WY Total
1952-1953					1.19	1.69	2.12	3.15	3.19	3.19	3.39	13.40
1953-1954	0.16	0.31	0.43	0.71	1.01	1.48	1.75	2.32	2.32	2.32	2.34	15.46
1954-1955	0.13	0.23	0.25	0.29	0.39	0.62	0.82	1.30	1.36	1.67	1.72	16.91
1955-1956	0.08	0.11	0.16	0.31	0.55	0.74	0.89	1.39	1.59	2.00	3.65	19.83
1956-1957	0.13	0.24	0.29	0.40	0.54	0.72	0.84	1.22	1.59	1.99	2.36	13.86
1957-1958	0.16	0.30	0.35	0.61	0.80	1.27	1.75	2.40	2.45	2.78	3.24	31.96
1958-1959	0.16	0.25	0.32	0.44	0.59	0.89	1.17	1.80	2.10	2.23	2.66	9.14
1959-1960	0.10	0.14	0.17	0.25	0.41	0.68	0.88	1.47	1.70	1.91	1.91	10.82
1960-1961	0.15	0.22	0.29	0.54	0.86	1.51	2.02	2.12	2.12	2.12	2.12	10.00
1961-1962	0.15	0.25	0.34	0.55	0.93	1.56	1.92	2.29	2.47	2.71	3.48	26.17
1964-1965	0.12	0.14	0.20	0.35	0.51	0.76	1.00	1.44	1.89	2.20	2.81	18.19
1965-1966	0.26	0.34	0.43	0.62	1.00	1.40	1.61	2.79	2.99	3.32	3.80	14.15
1966-1967	0.25	0.36	0.40	0.60	1.14	2.07	2.68	3.58	3.98	4.61	4.99	23.25
1967-1968	0.17	0.26	0.30	0.45	0.53	0.76	1.03	1.67	2.10	2.73	3.01	13.55
1968-1969	0.16	0.27	0.35	0.53	0.74	1.08	1.33	2.18	2.64	3.42	4.19	30.46
1969-1970	0.16	0.23	0.29	0.44	0.55	0.68	0.98	1.43	1.43	1.57	1.92	11.88
1970-1971	0.18	0.24	0.25	0.36	0.51	0.68	0.93	1.58	1.90	2.57	2.66	14.00
1971-1972	0.09	0.14	0.16	0.24	0.37	0.56	0.78	1.34	1.60	1.80	1.98	8.64
1972-1973	0.24	0.34	0.37	0.48	0.75	1.29	1.63	2.32	2.57	2.74	2.78	24.69
1973-1974	0.17	0.27	0.40	0.50	0.70	0.90	1.08	1.40	1.54	1.83	2.46	17.27
1974-1975	0.12	0.19	0.28	0.50	0.92	1.47	1.92	3.13	3.82	4.62	4.75	19.41
1975-1976	0.12	0.21	0.27	0.46	0.80	1.15	1.29	1.69	2.16	2.21	3.32	9.51
1976-1977	0.21	0.29	0.38	0.57	0.94	1.47	1.96	2.42	2.54	2.57	2.57	14.89
1977-1978	0.41	0.77	1.18	1.44	1.63	1.80	2.17	2.70	2.79	3.21	4.94	42.34
1978-1979	0.20	0.34	0.46	0.74	0.81	0.83	1.06	1.91	2.34	2.41	2.41	21.72
1979-1980	0.24	0.34	0.46	0.65	0.94	1.58	1.96	2.90	3.42	4.20	4.51	24.64
1980-1981	0.11	0.19	0.24	0.30	0.45	0.74	1.01	1.55	1.85	2.17	2.22	14.30
1981-1982	0.18	0.21	0.27	0.45	0.62	0.77	0.85	1.10	1.28	1.31	1.42	16.28
1982-1983	0.24	0.41	0.62	0.95	1.22	1.57	1.66	2.80	3.35	3.73	4.04	41.41
1983-1984	0.21	0.28	0.33	0.45	0.68	1.06	1.59	2.14	2.27	2.59	3.30	13.35
1984-1985	0.21	0.25	0.26	0.26	0.34	0.63	0.86	1.57	1.91	2.24	2.53	11.96
1985-1986	0.19	0.33	0.44	0.62	0.86	1.08	1.25	1.86	2.22	2.60	3.14	22.85
1986-1987	0.18	0.20	0.22	0.34	0.61	0.70	0.94	1.05	1.24	1.50	2.47	11.62
1987-1988	0.15	0.20	0.28	0.44	0.55	0.93	1.12	1.37	1.53	1.53	1.87	13.41
1988-1989	0.14	0.16	0.20	0.29	0.55	0.80	0.86	1.06	1.07	1.08	1.56	9.35
1989-1990	0.09	0.14	0.16	0.29	0.56	0.89	1.18	1.58	1.66	1.66	1.66	6.92
1990-1991	0.11	0.16	0.21	0.37	0.47	0.75	1.03	1.56	1.73	2.30	3.73	17.73
1991-1992	0.18	0.33	0.49	0.87	1.23	1.60	1.69	1.85	1.94	2.05	2.19	19.79
1992-1993	0.36	0.47	0.61	0.88	1.30	1.48	2.04	2.19	2.51	2.83	3.91	31.71
1993-1994	0.15	0.29	0.37	0.55	0.70	0.96	1.22	1.64	1.68	1.79	1.79	13.02
1994-1995	0.40	0.74	1.06	1.40	1.75	2.31	3.11	4.25	5.59	6.51	7.45	38.52
1995-1996	0.09	0.13	0.17	0.29	0.43	0.68	0.98	1.36	1.62	2.40	3.61	17.78
1996-1997	0.22	0.40	0.48	0.65	0.67	0.72	0.91	1.39	1.92	2.45	2.83	19.10
1997-1998	0.48	0.84	1.07	1.18	1.22	1.34	1.67	2.53	2.78	3.41	4.66	46.97
1998-1999	0.10	0.20	0.24	0.28	0.39	0.56	0.76	1.14	1.27	1.49	1.56	10.99
1999-2000	0.35	0.54	0.70	0.93	1.20	1.60	1.86	2.67	2.89	3.30	3.67	22.75

Station Number: 234 **Latitude:** 342531 **Longitude:** 1194212

Station Name: Santa Barbara (Downtown-County Building) **Elevation (ft):** 100 **Rainfall (in.)**

WY	5min	10min	15min	30min	1hr	2hr	3hr	6hr	8hr	12hr	24hr	WY Total
2000-2001	0.21	0.35	0.47	0.61	0.69	1.04	1.53	2.74	3.29	3.91	4.28	25.81
2001-2002	0.12	0.21	0.28	0.48	0.84	1.06	1.19	1.38	1.40	1.40	1.40	9.01
2002-2003	0.14	0.25	0.36	0.66	1.23	2.23	2.47	3.35	4.12	4.30	5.50	24.98
2003-2004	0.09	0.16	0.23	0.43	0.83	1.43	1.88	2.84	3.04	3.34	3.50	10.70
2004-2005	0.24	0.37	0.41	0.54	0.90	1.23	1.79	2.23	2.36	2.70	4.53	36.94
2005-2006	0.16	0.20	0.28	0.48	0.92	1.64	1.95	2.11	2.16	2.56	2.86	22.44
2006-2007	0.16	0.24	0.28	0.32	0.44	0.56	0.68	0.72	0.72	0.80	1.12	6.41
2007-2008	0.30	0.44	0.50	0.58	0.75	1.41	2.00	3.09	3.43	3.78	3.87	17.62
2008-2009	0.20	0.26	0.29	0.38	0.71	0.86	0.89	1.06	1.29	1.68	1.69	11.83
2009-2010	0.13	0.20	0.24	0.37	0.70	1.13	1.55	2.31	2.60	2.97	3.69	20.44
Total	10.21	15.93	20.54	29.67	43.92	63.40	80.09	112.43	127.32	145.31	172.02	1062.13
N	55	55	55	55	56	56	56	56	56	56	56	56
Mean	0.19	0.29	0.37	0.54	0.78	1.13	1.43	2.01	2.27	2.59	3.07	18.97
Max	0.48	0.84	1.18	1.44	1.75	2.31	3.11	4.25	5.59	6.51	7.45	46.97
Min	0.08	0.11	0.16	0.24	0.34	0.56	0.68	0.72	0.72	0.80	1.12	6.41
STDev	0.09	0.15	0.21	0.26	0.31	0.44	0.55	0.75	0.89	1.02	1.22	9.39
Reg CV	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.431
Reg Skew	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.20
Return Period in Years												
2	0.17	0.26	0.34	0.49	0.71	1.03	1.30	1.83	2.07	2.36	2.79	17.33
5	0.24	0.38	0.49	0.71	1.03	1.48	1.87	2.63	2.98	3.40	4.02	24.93
10	0.29	0.46	0.59	0.85	1.24	1.78	2.25	3.16	3.58	4.09	4.84	29.92
25	0.35	0.55	0.71	1.03	1.50	2.16	2.73	3.83	4.34	4.95	5.86	36.05
50	0.40	0.62	0.80	1.16	1.68	2.43	3.07	4.31	4.88	5.57	6.60	40.47
100	0.44	0.69	0.89	1.28	1.87	2.69	3.40	4.78	5.41	6.18	7.31	44.72
200	0.48	0.76	0.98	1.41	2.05	2.96	3.74	5.25	5.94	6.78	8.03	48.89
500	0.55	0.86	1.10	1.59	2.32	3.34	4.22	5.93	6.71	7.66	9.07	55.26
1000	0.58	0.91	1.17	1.69	2.46	3.55	4.48	6.29	7.12	8.13	9.62	58.29
10000	0.72	1.12	1.44	2.08	3.02	4.36	5.51	7.74	8.77	10.00	11.84	71.37

Hydrologic Soil Group—Santa Barbara County, California, South Coastal Part
(De La Guerra Plaza Improvements)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:2,790 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Barbara County, California, South Coastal Part
Survey Area Data: Version 5, Jan 3, 2008

Date(s) aerial images were photographed: 6/7/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Santa Barbara County, California, South Coastal Part				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
MeC	MILPITAS-POSITAS FINE SANDY LOAMS, 2 TO 9 PERCENT SLOPES	D	12.3	100.0%
Totals for Area of Interest			**12.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

DRAFT

City of Santa Barbara Development Application Review Team (DART)
Storm Water Management Plan (SWMP)

DART SWMP CHECKLIST

Project Address: De La Guerra Plaza Project Type: _____

MST _____ PRT or DART: _____

Date: 2-15-2011 Case Planner: _____

Project Area Acreage: 1.1 Acres Disturbed: 1.1 Slope %: 2.2 Adjacent to Creek Y/N: N

The following design standards and best management practices (BMP) for storm water management are required under National Pollution Discharge Elimination System (NPDES) provisions (State Regional Water Quality Control Board Phase II General Permit for the City). These measures are included in the City Storm Water Management Plan (SWMP) adopted to implement the NPDES requirements through the City development and redevelopment review and permitting process. The City is required to document to the Regional Board yearly how these measures have been implemented.

As part of a pre-application or application review process for a project discretionary permit by the City, DART members review for project design standards and other BMPs that can feasibly be taken to reduce storm water pollution to the maximum extent practicable.

Identify whether measures on the checklist are applicable, and whether they are applied through a project design revision prior to permit approval, and/or a condition of project approval. If the measure is not feasible, indicate why not.

1.0 CONSTRUCTION PHASE BEST MANAGEMENT PRACTICES

1.1 Erosion and Sedimentation Control (*Building and Safety*)

☐ Not applicable. Project does not involve ground disturbance.

☐ Apply Standard Erosion Control Measures as condition (where disturbed soil <1 acre, slope <15%, property not adjacent to creek).

☑ Detailed Erosion Control Plan required (where disturbed soil ≥ 1 acre, slope > 15%, property adjacent to creek):

___ Detailed Plan required as part of DART application. Apply condition requiring plan implementation; or

X Apply condition requiring Detailed Plan submittal and approval prior to Building Permit, and plan implementation.

2.0 POST-CONSTRUCTION BEST MANAGEMENT PRACTICES

2.1 Peak Storm Water Run-Off Discharge Rates *(Public Works)*

☐ Not applicable. Project involves no/minimal change in permeable surface or peak storm water run-off discharge rate. No BMPs required.

X Drainage calculations are required as part of DART application (using County of Santa Barbara hydrograph data and Manning equation). X Drainage calculations are adequate.

☐ Project design would not increase peak 25-year storm water run-off and would reduce peak storm water run-off discharge rate to the maximum extent practicable, through:

___ Any increase in run-off will be retained on-site and filtered using structural BMPs such as detention basins, bioswales (vegetated filters), and/or mechanical BMPs such as manufactured filters.
BMPs _____

___ Increase in water will be retained with underground tanks.

X BMPs will be applied as follows:

X Project design as proposed (with condition of approval requiring project implementation as proposed, and ongoing maintenance of BMPs if applicable).

___ Revised project design submitted as part of the DART process (and application of condition of approval requiring project implementation as revised, and ongoing maintenance of BMPs).

__ Application of a condition of approval requiring feasible project design changes and/or other BMPs, and ongoing maintenance of BMPs.

2.2 Structural and Treatment Control BMPs *(Public Works, Creeks)*

☐ Not applicable.

☒ Long-term volumetric treatment control BMP will be incorporated into the project development (design criterion is a 1" storm).

If infiltration is feasible at site. Requires further geotechnical testing.

☐ Long-term flow-based treatment control BMP will be applied (design criterion is .25" for four hours).

☒ BMPs will be applied as follows:

- X Project design as proposed (with condition of approval requiring project implementation as proposed and ongoing maintenance of BMPs if applicable).
- __ Revised project design submitted as part of the DART process (and application of condition of approval requiring project implementation as revised, and ongoing maintenance of BMPs).
- __ Application of a condition of approval requiring feasible project design changes and/or other BMPs, and ongoing maintenance of BMPs.

2.3 Minimization of Storm Water Pollutants of Concern *(Creeks, Public Works)*

☐ Not applicable

☐ General pollutants/ small projects: Passive, low maintenance BMPs will be applied through minimizing hardscape; vegetative swales, use of permeable paving; and/or detention basin.

☒ Automotive pollutants/ oil, grease, metals: The following BMPs will be applied for projects with 10 or more parking spaces: __Runoff from entrance drive for covered parking will be treated by collecting water in a trench drain and filtering before discharge. __Basement parking garages will provide treatment of any storm water discharged from basement garage to storm drain. X Runoff will be discharged to a vegetated swale or constructed sand filter, or through a manufactured BMP (drain filter or wet-sump filter).

☐ Erosion and Sedimentation/ suspended solids: Projects in hillsides, near creeks, or involving substantial earthwork: BMPs applied for long-term post-construction slope stability and erosion/sedimentation control, such as site layout to avoid ≥15% slopes, adequate setbacks from creeks.

☒ BMPs will be applied as follows:

- X Project design as proposed (with condition of approval requiring project implementation as proposed and ongoing maintenance of BMPs if applicable).
- __ Revised project design submitted as part of the DART application process (and condition of approval requiring project implementation as revised, and ongoing maintenance of BMPs).
- ~~X Condition of approval requiring feasible project design changes and/or other BMPs, and ongoing maintenance~~ of BMPs.

2.4 Natural Area Conservation BMPs *(Planning)*

☒ Not applicable.

☐ Development is clustered leaving remaining land in natural condition.

☐ Grading and clearing of native vegetation is limited to amount needed for lots, access, and fire protection.

☐ Trees and vegetation are maximized to the extent feasible, and use of drought-tolerant plants is promoted.

☐ Natural vegetation is promoted through use of parking lot islands and other landscaped areas.

☐ Riparian areas and wetlands are preserved.

☐ Natural area design standards will be incorporated to the extent applicable and feasible, consistent with City policies, as follows:

___ Project design as proposed (with condition of approval requiring project implementation as proposed, and ongoing maintenance of BMPs if applicable).

___ Revised project design submitted as part of the DART process (and application of condition of approval requiring project implementation as revised, and ongoing maintenance of BMPs).

___ Application of a condition of approval requiring feasible project design changes and/or other BMPs, and ongoing maintenance of BMPs.

2.5 Protection of Slopes and Channels (*Planning, Building, Public Works, Creeks)*

☒ Not applicable. Project is not adjacent to creek, and does not include substantial slopes.

☐ The following additional information has been required:

___ Existing site conditions: geomorphic, hydraulic, biological, geotechnical; top-of-bank determination.

___ Proposed project information and plans, potential effects on slopes and channels, and plans/measures to protect slopes/channels (preliminary grading plan; preliminary drainage plan; slope stability, permanent erosion control, vegetation management,, preliminary creek restoration and enhancement plan, including protection of biological values such as shade provisions, water temperature maintenance, nutrient filtering, wildlife movement corridors; fish movement; wildlife habitat protection.)

☐ Runoff will be conveyed safely from the toes of slopes and disturbed slopes will be stabilized.

☐ Natural drainage channels will be used to the maximum extent practicable.

☐ Permanent channel crossings will be stabilized.

☐ Slopes will be vegetated with appropriate native or drought-tolerant vegetation.

☐ Energy dissipaters, such as riprap, will be installed at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion with the approval of all agencies with jurisdiction.

☐ The project will incorporate slope and/or channel protection design standards to the extent applicable and feasible, consistent with applicable City policies, as follows:

___ Project design as proposed (with condition of approval requiring project implementation as proposed, and ongoing maintenance of BMPs if applicable); or

___ Revised project design submitted as part of the DART process (and application of condition of approval requiring project implementation as revised, and ongoing maintenance of BMPs); or

___ Condition of approval requiring feasible project design changes and/or other BMPs, and ongoing maintenance of BMPs.

2.6 Storm Drain Stenciling and Signage (*Public Works, Building*)

☐ Not applicable. No storm drain inlets.

☒ Condition of approval will be applied that public and private storm drain inlets and catch basins within the project area must be stenciled with language and/or graphic icons prohibiting dumping of improper materials directly into the storm water conveyance system. Signs prohibiting illegal dumping must be posted at public access points along channels and creeks within the project area. Legibility of stenciling and signs must be maintained.

2.7 Outdoor Material Storage Design *(Planning, Building)*

☒ Not applicable. No outdoor material storage area.

☐ Materials with the potential to pollute storm water will be placed within an enclosure such as cabinet, shed or similar structure that prevents contact with runoff or spillage to the storm water conveyance system, or will be protected by secondary containment structures such as berms, dikes, or curbs. The storage area will be paved and sufficiently impervious to contain leaks and spills. The storage will have a roof or awning to minimize collection of storm water within the secondary containment.

☐ The project will incorporate BMPs as follows:
___ Project design as proposed incorporates these measures.
___ Revised project design submitted as part of DART review process incorporates these measures.
___ These measures are feasible and will be applied as a condition of permit approval.

2.8 Trash Storage Area Design *(Public Works)*

☒ Not applicable. No trash storage area.

☐ Trash containers will have drainage from adjoining roofs and pavement diverted around the areas; and trash container areas will be screened or walled to prevent off-site transport of trash. Individual single family residences may be exempted if determined by City to be infeasible.)

☐ The BMPs will be incorporated as follows:
___ Project design as proposed.
___ Revised project design submitted as part of DART review process.
___ These measures are feasible and will be applied as a condition of permit approval.

2.9 Ongoing BMP Maintenance *(Planning, Building, Public Works, Creeks)*

☐ Not applicable. No BMPs are required.

☒ Condition will be applied to establish BMP maintenance agreement providing owner ongoing maintenance and yearly inspection.

2.10 Design Standards for Specified Individual Project Categories *(Planning, Building, Public Works, Creeks); refer to the Design Standards of Attachment 4 of the State General Permit (WQO 2003-0005-DWQ); per City SWMP, all discretionary projects, regardless of size, shall comply with the Design Standards in Attachment 4.*

☐ Not applicable.

☐ Commercial Projects: Proper design of loading/unloading dock areas; repair/maintenance bays; vehicle wash areas to protect water quality.

☐ Restaurants: Proper design of equipment/ accessory wash areas to protect water quality.

☐ Retail Gasoline Outlets: Proper design of fueling areas to protect water quality.

☐ Automotive Repair Shops: Proper design of fueling areas; repair/maintenance bays; vehicle/equipment wash areas; and loading/unloading dock areas to protect water quality.

2, ☒ Parking Lots: Proper design of parking areas to protect water quality; and operational provisions to limit oil contamination.

☒ BMPs will be incorporated as follows:

X Project design as proposed.

___ Revised project design submitted as part of DART review process.

___ These measures are feasible and will be applied as a condition of permit approval.